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Protection strategy for the habitats of sea mammals[1]

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The following contains data on the protection strategy for sea mammals, presented at the recent General Assembly of the International Union for the Conservation of Nature and Natural Resources (IUCN) [Ashkhabad, 1978]. The cycle of investigations carried out under the supervision of Prof. George-Carleton Ray of John Hopkins University (USA), devoted to the development of objective methods for determining the so-called critical habitats (the protection of which are vital to the preservation of this or that species), illustrates a new approach based on the example of the critical habitats of the walrus in the northern part of the Pacific Ocean. The point, however, is not in the walrus, or even in sea mammals (by the way, the numbers of the Pacific walrus have increased at least several-fold over the past decades as a result of joint USSR—USA conservation measures), but in the fact that this approach opens the way for scientific determination of the status of reserves for all migrating species of animals without exception. There is quite a number of these species among mammals, birds, reptiles, fish, and even invertebrates. It is not without reason that in 1979, several tens of countries concluded a special Convention on the Protection of Migratory Species of Animals, known as the Bonn Convention (to which the USSR is also a signatory).

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[1]Abridged version of paper published in "Oceanus", 1978, v. 21, No. 2, p. 55

In the minds of people, the protection of sea mammals is usually associated with the isolation of the area inhabited by a given species. Before preserving this or that species within an isolated area, it is necessary to determine which area is of particular biological importance. With this purpose in mind, the International Union for the Conservation of Nature and Natural Resources (IUCN) launched the project "Critical Habitats of Marine Mammals" several years ago.

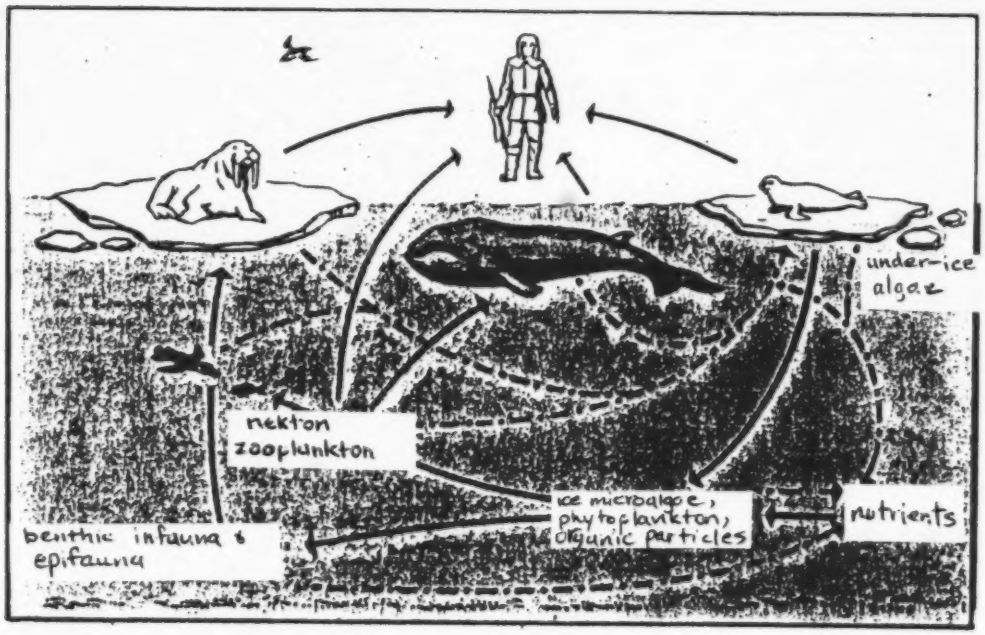
The term "critical habitats" is usually applied to the last strongholds of a rare or endangered species. This term is not extensive enough to include at least the migratory sea mammals or those animals which have not yet reached the critial level of abundance. For example, the main goals of the 1973 US Statute on Endangered Species include the achievement of an optimal stable abundance for all the species of marine animals. However, it does not indicate how to determine optimal abundance. On the other hand, optimal abundance is apparently in complete contradiction to the concept of maximum sustainable yield, which is widely used in the fishing industry. The first of these has an ecological trend, while the second infers a decrease in numbers, often to a level that places a species at the mercy of environmental changes.

The protection strategy for animal habitats should be based on a good knowledge of all the areas where the individuals of a given population forage, breed and raise their young. We must also identify the systems which are vital to each of these functions.

More than four years ago, R. Salm managed to gather data on 25 species of sea mammals encountered off the US coast, and to develop a system which illustrates the concept of critical habitats.

However, this first attempt was not quite successful. About a year later, we were joined by J. Dobbin who already had marine research data from the Persian Gulf. His system was founded on the methods developed by C. Steinitz and others of Harvard University. The parallels observed in them as a result of our investigations also were remarkable.

To illustrate the method developed by us, we shall concentrate on one species, the walrus. Why the walrus? Though we may appear partial in our choice (one of us, G.C. Ray, has been studying walruses for about 20 years now), the real reasons for choosing the walrus were quite different.



Food relations of marine animals in the Bering Sea

- reprocessing of excrements and decomposition products

- food chains

First of all, Beringia, the home of the Pacific walrus, includes the continental shelves of the Chukchi and Bering seas, i.e. one of the major shelf regions of the world. Despite the fact that this region has been exploited for centuries, it still has not been studied in detail. We decided that by repeating and remapping all of the earlier observations on the same scale and in the same projection, we would better understand what lies ahead of us and what knowledge we lack.

Secondly, the mapping system depends on the level of knowledge; the walrus and its relations with the environment have been researched quite well in comparison with most of the other sea mammals.

Thirdly, walruses live in a constantly changing environment regulated by sea ice. At the present time, the ice conditions are determined mainly

with the help of artificial Earth satellites, which means that modern technology can be used to monitor the habitats of animals on a regional scale.

Fourthly, the growing oyster industry, as well as the mining for oil and other mineral resources, pose a considerable threat to the walrus and all the animals of this region.

Fifthly, any model developed successfully on the basis of walrus data can prove useful to the "Sea Mammal" project within the framework of the 1972 USA—USSR Agreement on the Conservation of the Natural Environment. The problem concerning the status of the walrus population involves both national and international interests, but on a comparatively simple basis, for only these two countries have jurisdiction over this particular region.

Where are the major walrus habitats located, and how can we protect them? These are strategic problems which we hope can be resolved efficiently.

First of all, we compiled a set of maps containing data on the depths, the types of water masses, the winter and summer currents, the ice cover, the coastal sources of nutrients and the marine sediments of the Bering area.

We then gathered biological data on the distribution of walrus numbers, as well as data on their feeding habits and their social structure. We also kept a record of the existing and proposed social-economic measures, specifically data on the transport system, the fishing industry, the oil and gas industry, and the traditional fishing and hunting activities of the local native population.

Areas of intense anthropogenic activity

centres of fishing and hunting activity of the native population

transportation routes

fishing areas

areas rich in oil and gas

The final group of facts had to do with the legal aspect of the problem. This included information about the 200-mile economic zone (only a small part of the Bering Sea is international waters), other questions of

jurisdiction in the areas of the 3-mile and 12-mile zones, as well as proposals for establishing parks and reserves along the shores of Alaska, especially in the areas that affect the waters of the Bering Sea or wedge into them.

The gathering of such information is no easy task. The basic source of our information was the multivolume "Program for Energy Evaluation of the Outer Continental Shelf of Alaska". However, it is practically devoid of any analysis of data from the ecological, systematic point of view. For example, what are the interactions between the physical and biological factors, or, in other words, how "vulnerable" is an animal in its natural habitat?

To answer this question, we first determined the areas where walruses mate, raise their young, and rest, as well as the areas of their spring and autumn migrations. We then marked the areas with the lowest food supply, taking into account that the food requirement of a suckling female walrus doubles. All of this information was transferred onto transparent superimposed graticules on which the various data were marked in different colours.

This is how the first critical habitats of the walrus were established. They illustrate the vulnerability of this species only in the natural habitat (determined by its biological functions and food supply), not its vulnerability determined on the basis of social-economic activity. This model can be made more precise simply by adding new data to the map.

Having determined the high-vulnerability areas for the walrus, we centered our attention on the numerous unresolved oceanographic problems related to the systems that sustain the marine environment. At first we identified the systems of currents and the coastal sources of food, and then, using a colour legend, again superimposed these data on the map of critical habitats in order to somehow evaluate the possible interrelations of the processes.

At this stage, we introduced data on social-economic activity in order to establish where the latter could be expected in the future. Each type of activity was assessed from the point of view of its importance to the life of the walruses.

Our system predicts the discovery of specific critical habitats of the walrus, which may find themselves threatened by man today or in the nearest future.

General map of critical habitats, resulting from the combination of several maps depicting various factors. This map indicates that the Bering Strait and the northern part of the central Bering Sea are the most vulnerable habitats for the walrus population

- areas of maximum threat

- areas of relative threat

Apparently, the most vulnerable areas are those where the young are raised, along the southern ice edge (especially south of Nunivak Is. and southwest of St. Lawrence Is.) and in the vicinity of the Bering Strait. These areas call for priority measures if we wish to preserve the optimal numbers of the walrus population.

We then correlated these areas with the data on jurisdiction in order to determine who is responsible for their protection. Apparently, a very long list of institutions could be drawn up at all the levels. For example, if it is found that the environmental system of the walrus is closely related to the drainage of the coastal rivers of Alaska, those responsible for the natural resources of the coast are also responsible for controlling the quality of the water and the inflow of nutrients into the Bering Sea.

Today, those in charge of the parks and reserves located on land (who deal mainly with problems of protecting land animals and with tourism) should become involved in protecting the ecosystem as a whole on a day to day basis. On the international scale, we must conclude an agreement to protect all the sea mammals that live on the ice and the entire ecosystem of which they are a part. There is no such agreement at the present time, though the idea has been put forth several times. An agreement instituting regional management of resources would be even more useful. A good beginning would be to map the critical habitats of various species of animals separately, as we have with the walrus, and then to integrate the results in order to establish their relationships.

We have already mentioned that all the data in the mapping system were transferred onto transparent coloured graticules. By their colour density we derived the quantitative factors. For example, where the biomass of the benthos is concerned, the darkest colour will correspond to the areas with the lowest food supply. The rivers may show up as darker and thicker lines, depending on their drainage, etc. Therefore, our model should be regarded as an ordinal-quantitative one, as it makes use of colour variations for denoting quantity or concepts such as "maximum", "mean", "minimum".

We should emphasize that the proposed system forms the basis of strategic planning both on the qualitative, and on the quantitative level. With its help, we can also establish a system of inverse relationship, as we can see from the following example. An increase in the mollusk fishery in the Bering Sea is a threat to the status of the walrus population, as mollusks are the basic food of the walrus. Therefore, we are faced with the problem of developing the mollusk fishery without upsetting the optimal numbers of the walrus population. In order to solve this problem, we must know where the critical walrus habitats are located.

At the same time, the solution of the "mollusk—walrus" problem is interrelated not only with factors such as biomass, productivity, population numbers and ecology of the benthos, but also with questions of jurisdiction. Because of this, the system of superimposed maps becomes a well-defined method of detecting interrelations existing between ecological, geographic and anthropogenic factors.

There is no doubt that the critical habitats in the open sea will be difficult to use as a "sanctuary".

What is the key to protecting the environment of sea mammals? It is not to protect the critical habitats in the old sense, i.e. by setting up special off-limit areas (to the fishing industry in this case), but to institute an ecosystem approach to the habitats and to the systems sustaining them. All efforts in the conservation of sea mammals should be directed at this. The general concern about the killing of animals does not solve the problem either. The destruction of their environment, in the same way as we are destroying our own, is a far more effective way of killing them than by the direct method. The ecological approach to protecting the habitats of marine animals calls for the combination of numerous factors and the joint efforts of people working in the most diverse fields and departments.

To establish sanctuaries at certain points along the coast and in the ocean without considering the factors responsible for the changes or other complex problems is just as illogical ecologically as it is to conform to the current sea laws on "boundary lines". For example, the International Whaling Commission set up a protected region in the Southern Ocean. In this way, the Commission protected the whales during their brief visits to a certain area. However, the real solution to the problem is to protect the habitat of each population all year round. In a similar way, the proposed sanctuaries for the grey whale off the shores of Mexico and for the humpback whale off the shores of Hawaii can protect these animals only for short periods of time. What will become of the whole area of their habitats throughout the year?

It is time to discard the idea of a critical habitat as some "out-of-the-way" place. The range of the walrus, the ice and open sea, is a dynamic area; it moves together with the prevailing local winds in the northern part of the Pacific Ocean and in the southern part of the Arctic. The breeding grounds and wintering areas may change considerably from year to year.

An integrated dynamic approach to ocean processes is far more appropriate than research in a narrow field. It is the ecosystem approach that should be used to solve the problem of critical habitats over a long

period of time. An approach of this type can also serve as a key to the protection of critical human habitats as well.

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